Surface water's quality – a risk decision-making approach

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ABSTRACT

This paper focuses on Agueda´s watershed environmental caracterization. The Águeda's project is an ongoing work in the framework of the POCTEP program. The main core of the present work is the construction of a methodological body to be used as a generic and flexible tool starting with a full environmental characterization as start point for a dynamic risk analysis, allowing the definition of leverage strategies e.g. to land management in this transboundary region.

The first part of our work regards to the surface water quality's characterization. A sampling campaign was conducted between October and December of 2011. The following chemical parameters were analyzed: biochemical oxygen demand (BOD), dissolved oxygen concentration (DO), Ntotal; pH, temperature and electric conductivity. The dissolved oxygen concentration (DO) and the biochemical oxygen demand (BOD) were used as indicators for evaluating the environmental pollution. Pollution's simulation was performed by a coupled hydrodynamic and water dispersion model, using QUAL2kw software. The simulation results are consistent with field observations and demonstrate that the model has been correctly calibrated

The second part of our work regards to the vulnerability mapping construction for the Agueda's watershed. The DRASTIC Pesticide índex was used. The DRASTIC is a parametric method (developed by US EPA) for evaluating the intrinsic vulnerability of groundwater systems on a regional scale. It takes account of the inherent geological, hydrological and hydrogeological characteristics of an area, but is independent of the nature of human activities. The parameters included in the method are: Depth to water; net recharge, aquifer media, soil media, topography, impact of vadose zone, and hydraulic conductivity of the aquifer. Higher DRASTIC scores imply higher likelihood of contamination. The DRASTIC method includes two versions: the generic DRASTIC and the pesticides DRASTIC where the seven parameters' weights are reassigned in order to reflect the relevance of anthropic activities.

A Geographical Information System (GIS) was constructed in order to spatially overlap the vulnerability classes and the surface water quality's spatial distribution. The together visualization allows the identification of regions of, high/high, High/low, low/high and low/low, vulnerability/risk.

The high/high areas are rather located in the central zone which is the tertiary aquifer and the largest urban area. Feasibility studies of different treatment schemes and the development of specific monitoring activities must be adressed in future work.